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# **Suisun Marsh Monitoring Program Channel Water Salinity Report**

Reporting Period: December 2009 and January 2010

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## 1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT

As per SWRCB Water Rights Decision 1641, dated December 29, 1999, and previous SWRCB decisions, the California Department of Water Resources (DWR) is required to provide monthly channel water salinity compliance reports for the Suisun Marsh to the SWRCB. Conditions of channel water salinity in the Suisun Marsh are determined by monitoring specific electrical conductivity, which is referred as "specific conductance" (SC). The locations of all listed stations are shown in Figure 5.

The monthly reports are submitted for October through May each year in accordance with SWRCB requirements. The reports are required to include salinity data from the stations listed below to ensure salinity standards are met to protect habitat for waterfowl in managed wetlands:

Station Identification	Station Name	General Location	Classification
C-2*	Collinsville	Western Delta	Compliance Station
S-64	National Steel	Eastern Suisun Marsh	Compliance Station
S-49	Beldon's Landing	North-Central Suisun Marsh	Compliance Station
S-42	Volanti	North-Western Suisun Marsh	Compliance Station
S-21	Sunrise	North-Western Suisun Marsh	Compliance Station

Data from the stations listed below are included in the monthly reports to provide information on salinity conditions in the western Suisun Marsh.

Station Identification	Station Name	General Location	Classification
S-97	Ibis	Western Suisun Marsh	Monitoring Station
S-35	Morrow Island	South-Western Suisun Marsh	Monitoring Station

Information on Delta outflow, area rainfall, and operation of the Suisun Marsh Salinity Control Gates are also included in the monthly reports to provide information on conditions that may affect channel water salinity in the Marsh.

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\* Throughout the report, the representative data from nearby USBR station is used in lieu of data from station C-2.

## 2. Monitoring Results

### 2.1 Channel Water Salinity Compliance

During the month of December, 2009 and January 2010, **deficiency standards were in effect at only two compliance stations (i.e. S21 and S42)** per water rights decision 1641. Compliance with standards for the month of December and January were determined for each compliance station by comparing the progressive daily mean of high-tide SC with respective standards. The standard for compliance stations S-21 and S-42 is 15.6 mS/cm during December 2009 and January 2010. Table 1 lists monthly mean high-tide SC at these compliance stations. The progressive daily mean (PDM) is the monthly average of both daily high-tide SC values. The mathematical equation is shown below.

$$\text{PDM} = \frac{\sum \text{daily average of high tide SC}}{\text{\# days of the month}}$$

### 2.2 Delta Outflow

Outflow for December 2009 was mostly below 6,500 cfs, except in mid-December, where there was a brief peak in outflow to about 13,000 cfs and sharply declined thereafter and remained below 6,500 cfs for the remainder of the month as shown in Figure 5.

The low outflow continued in early January before making an initial climb to about 14,500 cfs by mid-January. Thereafter, outflow took an impressive jump and peaked above 60,000 cfs in late January as a result of the weekly precipitation events that occurred and much needed to quench the thirst of reservoirs. Outflow dropped by the end of the month, but remained high and above 50,000 cfs as shown in Figure 5.

The monthly Delta outflow is represented by the mean Net Delta Outflow Index (NDOI). The NDOI is the estimated daily average of Delta outflow. Mean NDOI for December 2009 and January 2010 are listed below:

Month	Mean NDOI (cubic feet per second)
December	6,474
January	24,563

## 2.3 Rainfall

December rainfall events were sporadic and low in amount. Rainfall activities occurred mostly in mid-December with the largest daily total of 0.74 inches for the month. January rainfall events were much more impressive than December because the amount and duration were much more massive. January had continuous rainfalls between mid-January and end of January with the largest daily total of 1.80 inches for the month as shown in Figure 3. The monthly total for both months are shown below:

Month	Total Rainfall (inches)
December	2.13
January	8.29

## 2.4 Suisun Marsh Salinity Control Gate (SMSCG) Operations

Operations and flashboard/boat lock installations at the SMSCG during December 2009 and January 2010 are summarized below.

Date	Gate status	Flashboards status	Boat Lock status
December 1 – 20	3 Open	In	Open
December 21 – January 4	3 Tidally operate	In	Open
January 5 - 31	3 Open	In	Open

The gates were not operated at the start of December 2009 and continued to be in that status until late December when salinity became a concern resulting in re-operation on December 21, 2009. Operations continued until January 5, 2010; thereafter, salinity was not a concern given the early half of the month and to balance fish concerns at the time the gates ceased operations and remained that mode through January with the massive amount of outflow in late January that bring down salinity throughout the marsh.

## 3. Discussion

### 3.1 Factors Affecting Channel Water Salinity in the Suisun Marsh

Factors that affect channel water salinity levels in the Suisun Marsh include:

- delta outflow;
- tidal exchange;
- rainfall and local creek inflow;
- managed wetland operations; and,
- operations of the SMSCG and flashboard configurations.

## **3.2 Observations and Trends**

### **3.2.1 Conditions during the Reporting Period**

During December 2009 PDM salinity levels at Collinsville(C-2), National Steel(S-64), Beldons (S-49), and Volanti(S-42) ranged between 8.0 mS/cm and 17.0 mS/cm as shown in Figure 1. Salinity levels at all compliance and monitoring stations differ in magnitudes but overall was stable in December with a slight downward dip in late December, except for C-2, because of its proximity (i.e. closer) to the outflow path that it responded sooner and at a greater magnitude than other marsh stations as shown in Figure 1.

Although low in amounts, December rainfalls did contribute to the reduction of salinity levels coming into January, which is a plus from meeting standards perspective. Salinity levels at all compliance and monitoring stations in January was also stable for most of the month until late January where all stations salinity levels took a downward dip as shown in Figure 3 as a result of impressive rainfall events and totals for January given the dry fall period.

Overall, compliance were met at all stations for both December 2008 and January 2010 periods.

### **3.2.2 Comparison of Reporting Period Conditions with Previous Years**

Monthly mean high-tide SC at the compliance and monitoring stations for December 2009 and January 2010 were compared with means for those months during the previous nine years (Figure 4).

Mean salinity pattern of all compliance and monitoring stations for December 2009 resembles that of 2003 but at a greater magnitude. Compared to previous nine years, December 2009 salinity levels overall were ranked second in high Specific Conductance. Mean salinity patter of all compliance and monitoring stations for January 2010 resembles that of January 2009 but a lower level. Compared to previous nine years, January 2010 salinity levels overall were ranked third in high Specific Conductance. Unlike past years, the higher salinity in the past four Decembers and January were probably a combination of dry hydrologic conditions and operating the gates less to balance fish concerns.

**Table 1**

**Monthly Mean High Tide Specific Conductance at Suisun Marsh  
Water Quality Compliance Stations**

**December 2009**

Station	Specific Conductance (mS/cm)*	Deficiency Standard	Deficiency Standard meet?
C-2**	8.2	n/a	n/a
S-64	10.3	n/a	n/a
S-49	14.2	n/a	n/a
S-42***	14.5	15.6	Yes
S-21***	14.9	15.6	Yes

\*milliSiemens per centimeter

\*\*The representative data from nearby USBR station is used in lieu of data from station C-2.

\*\*\*As define in D1641 and RSMPPA, monthly standard only apply to compliance stations, S-42 and S-21 during deficiency year.

**January 2010**

Station	Specific Conductance (mS/cm)*	Deficiency Standard	Deficiency Standard meet?
C-2**	4.5	n/a	n/a
S-64	6.1	n/a	n/a
S-49	10.1	n/a	n/a
S-42***	10.1	15.6	Yes
S-21***	8.3	15.6	Yes

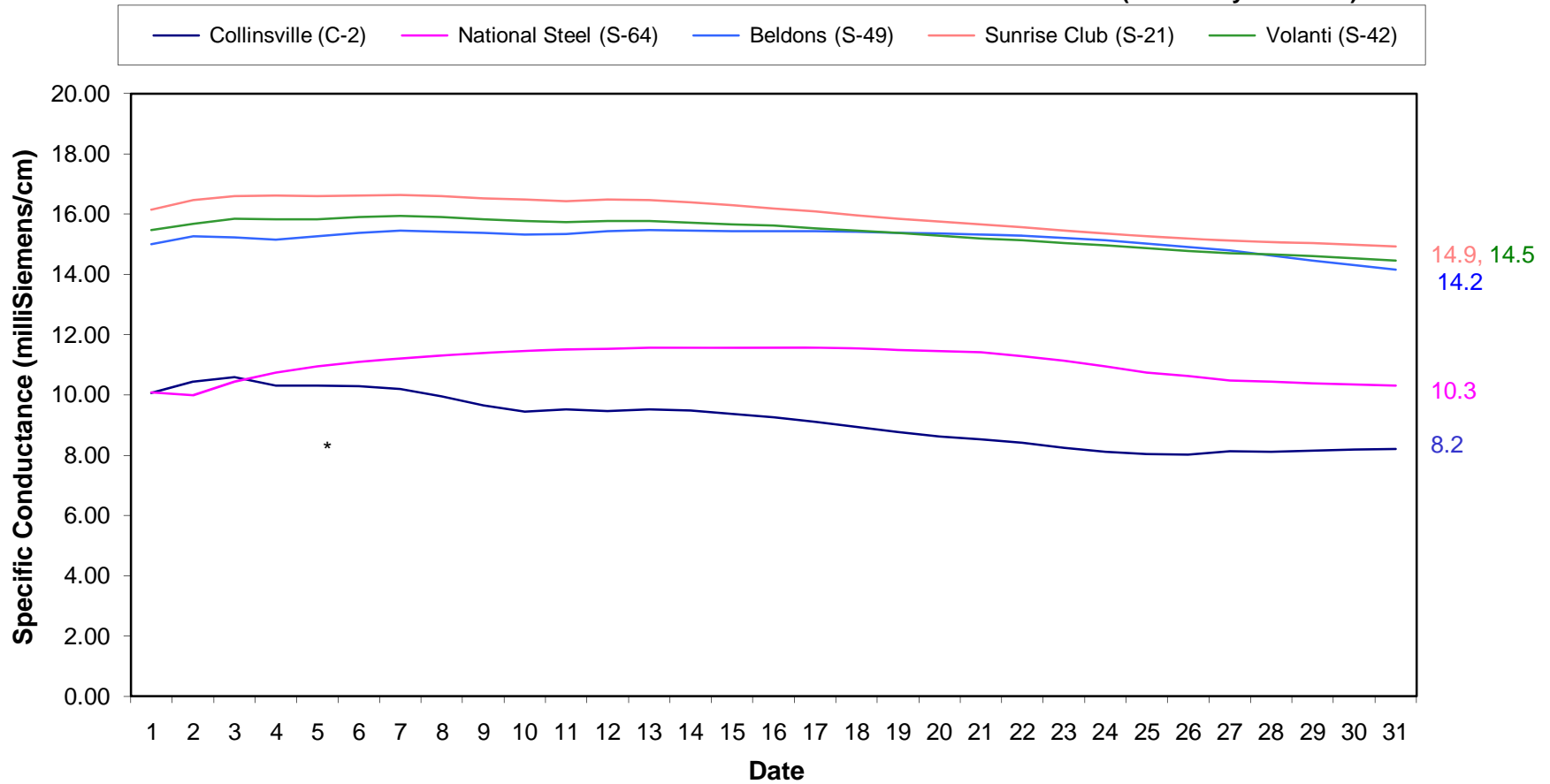
\*milliSiemens per centimeter

\*\*The representative data from nearby USBR station is used in lieu of data from station C-2.

\*\*\*As define in D1641 and RSMPPA, monthly standard only apply to compliance stations, S-42 and S-21 during deficiency year.

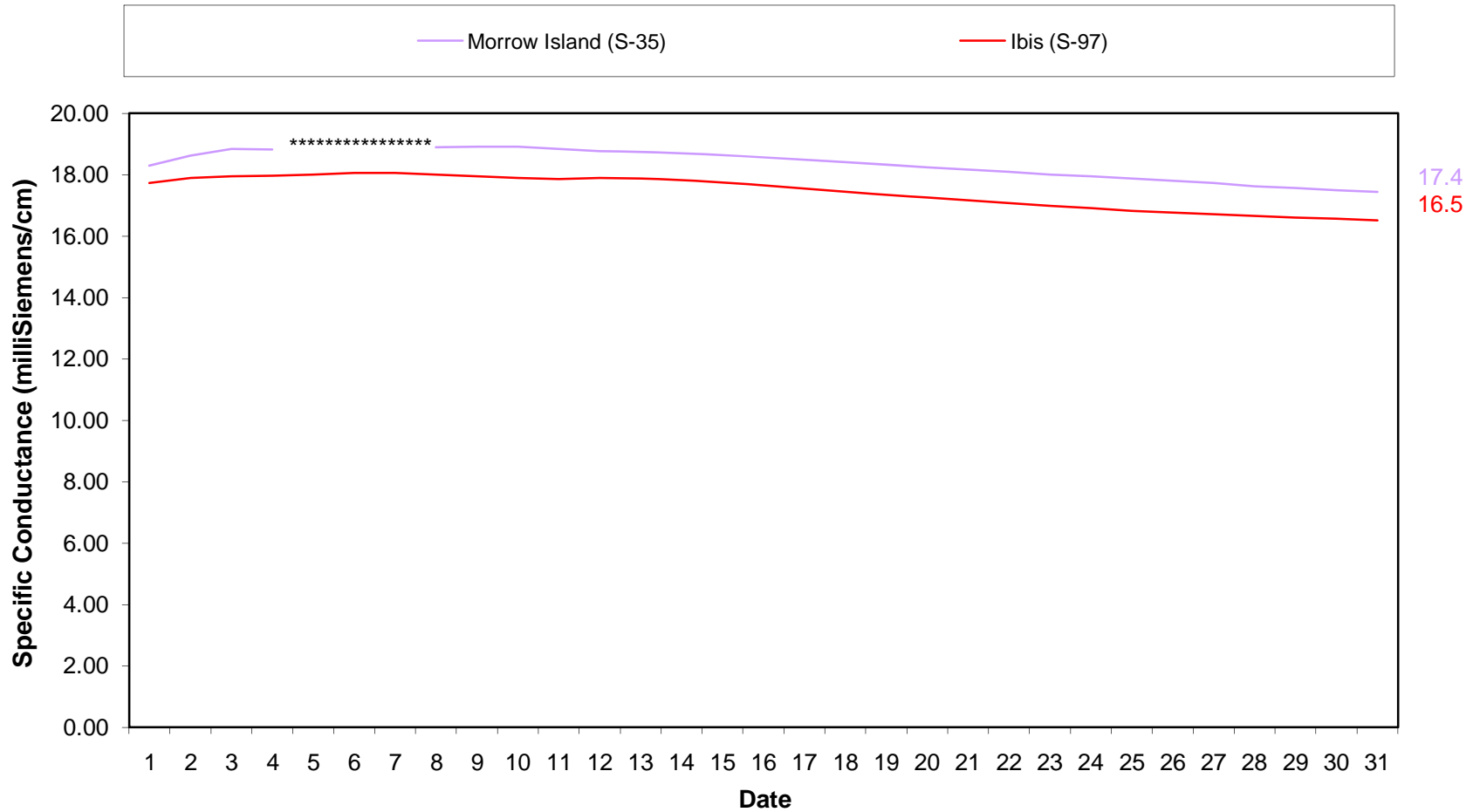
**Figure 1. Suisun Marsh Progressive Mean High Tide Specific Conductance  
December 2009**

**Standard = 15.6 mS/cm  
(deficiency standard)**



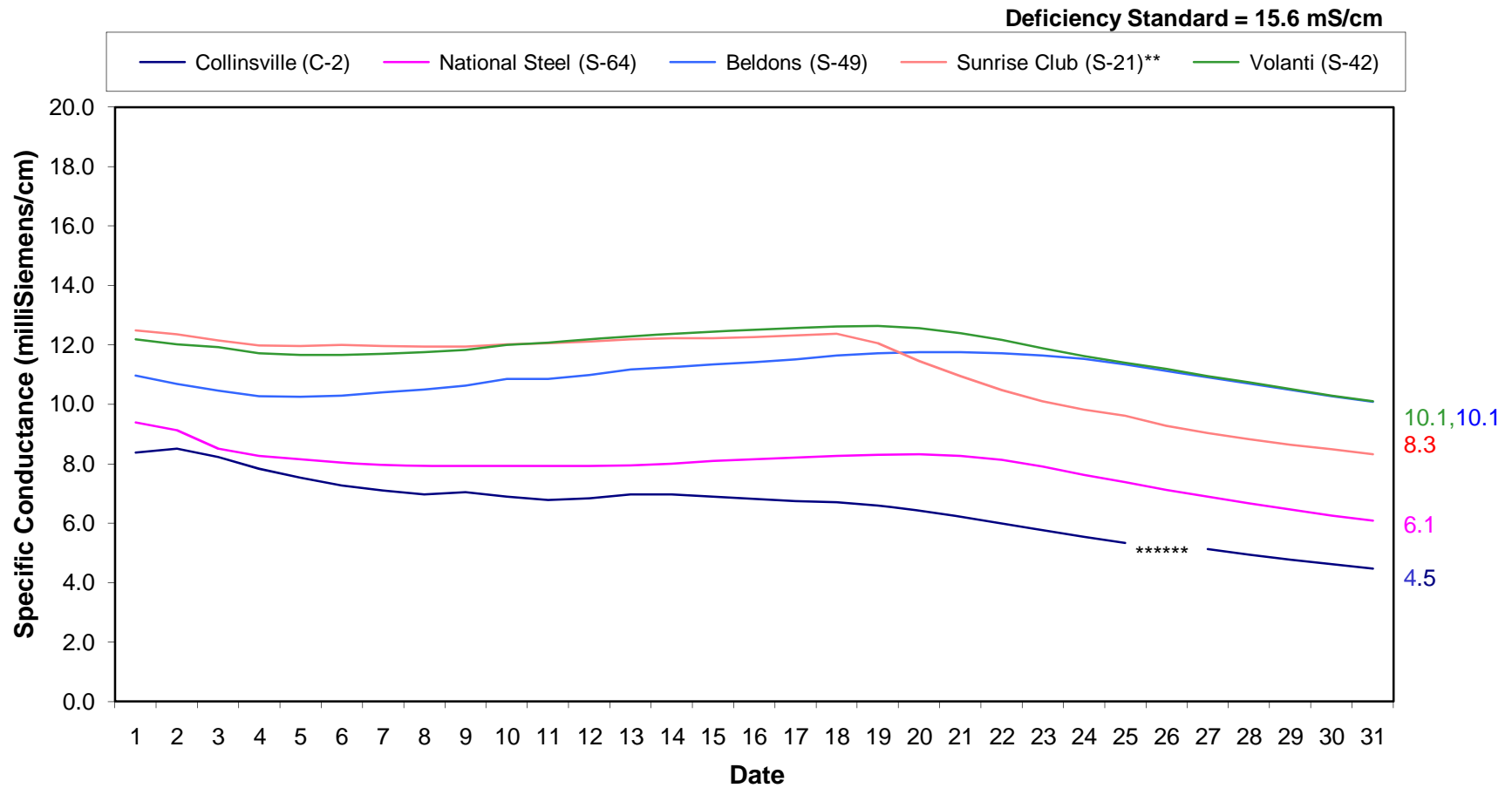


**Figure 2. Suisun Marsh Progressive Mean High Tide Specific Conductance  
December 2009**

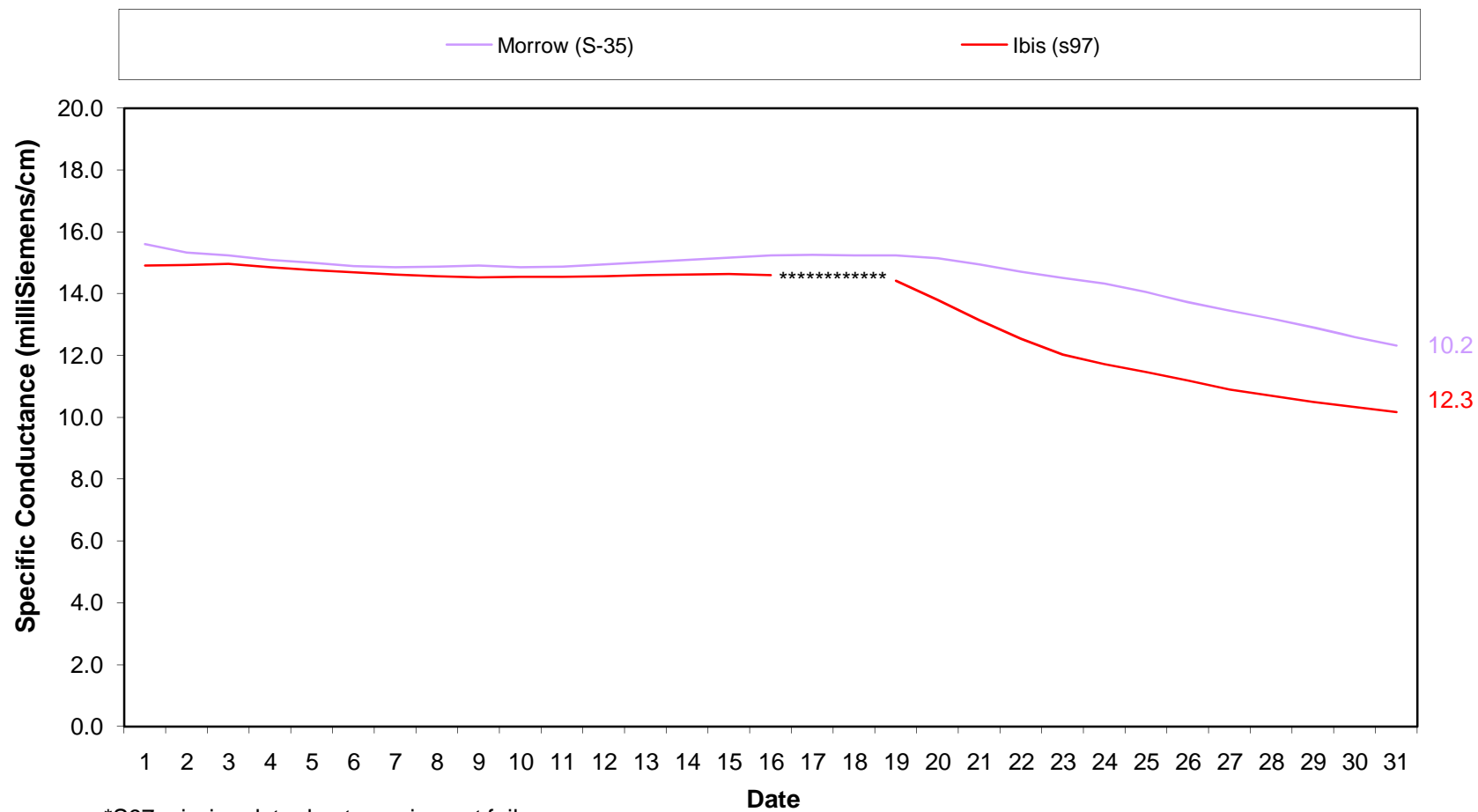


\*\*\*\*\* S35 data missing due to equipment problem.

**Figure 3. Suisun Marsh Progressive Mean High Tide Specific Conductance  
January 2010**

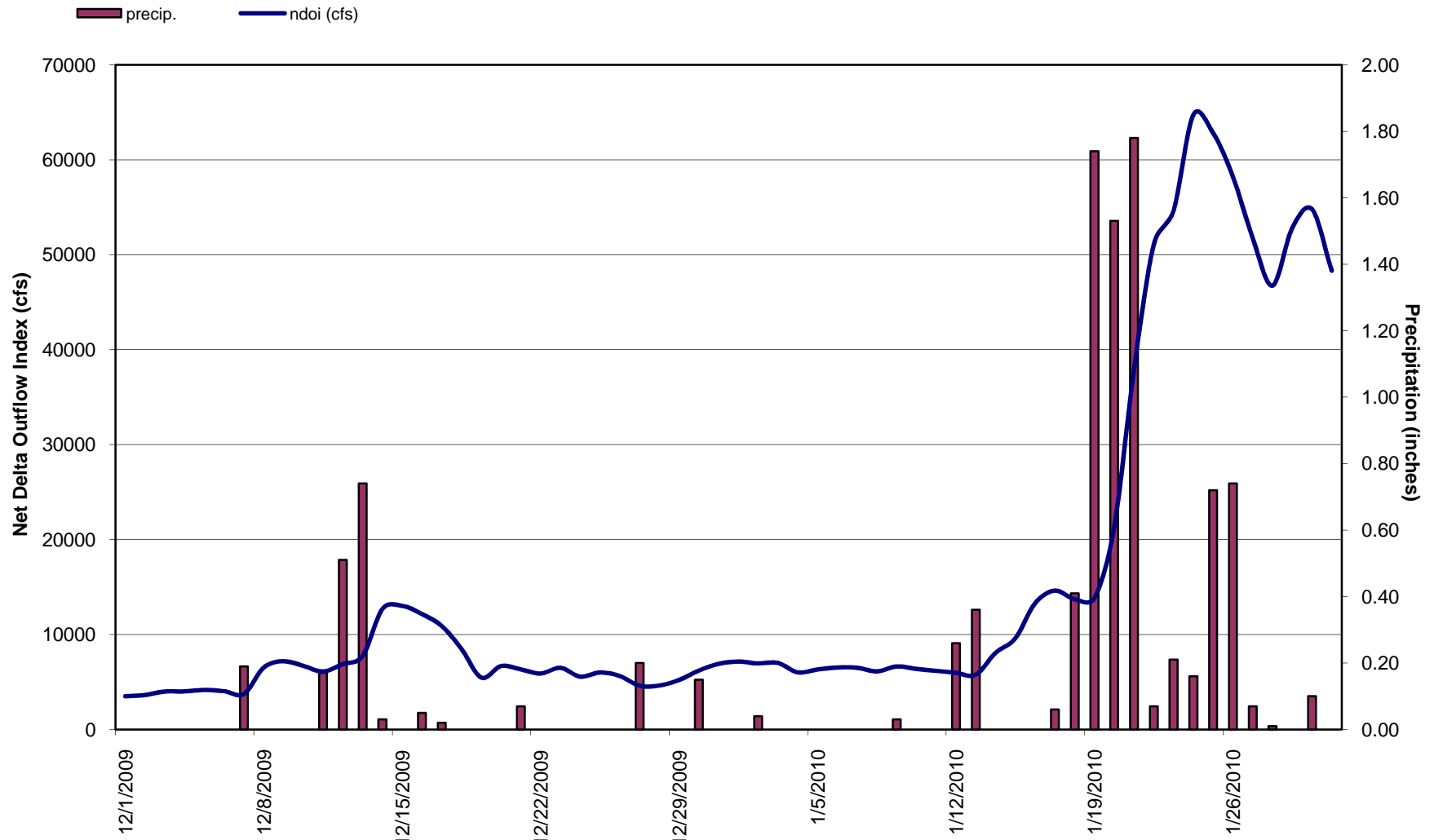


**Figure 4. Suisun Marsh Progressive Mean High Tide Specific Conductance  
January 2010**



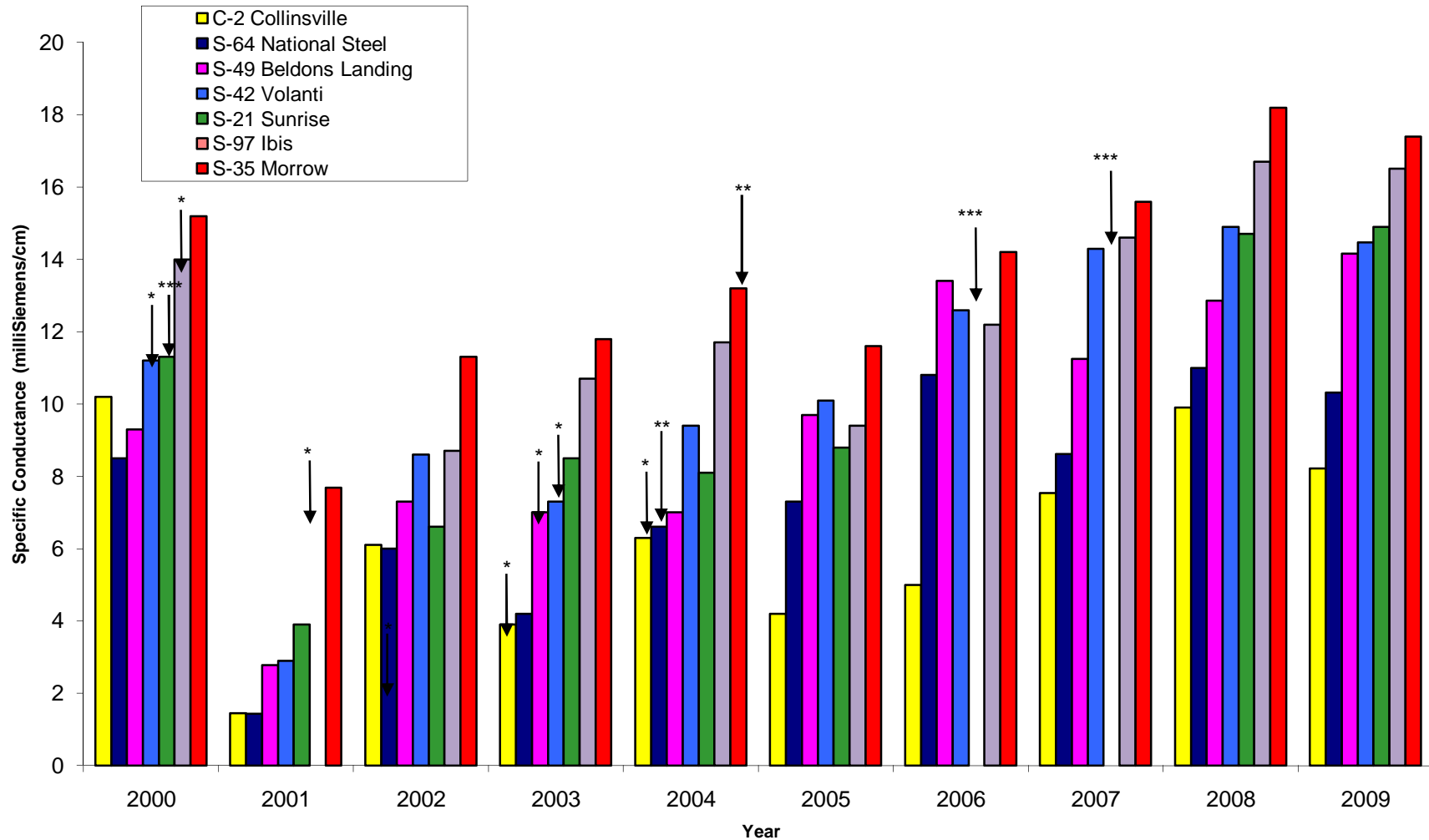
\*S97 missing data due to equipment failure.

**Figure 5. Daily Net Delta Outflow Index and Precipitation\***  
**December 2009 - January 2010**



\*Preliminary DWR, O&M Net Delta Outflow Index data and precipitation from Fairfield Treatment Plant in Suisun Marsh.

**Figure 6. Monthly Mean Specific Conductance at High Tide:  
Comparison of Monthly Values for Selected Stations  
December 2000-2009**

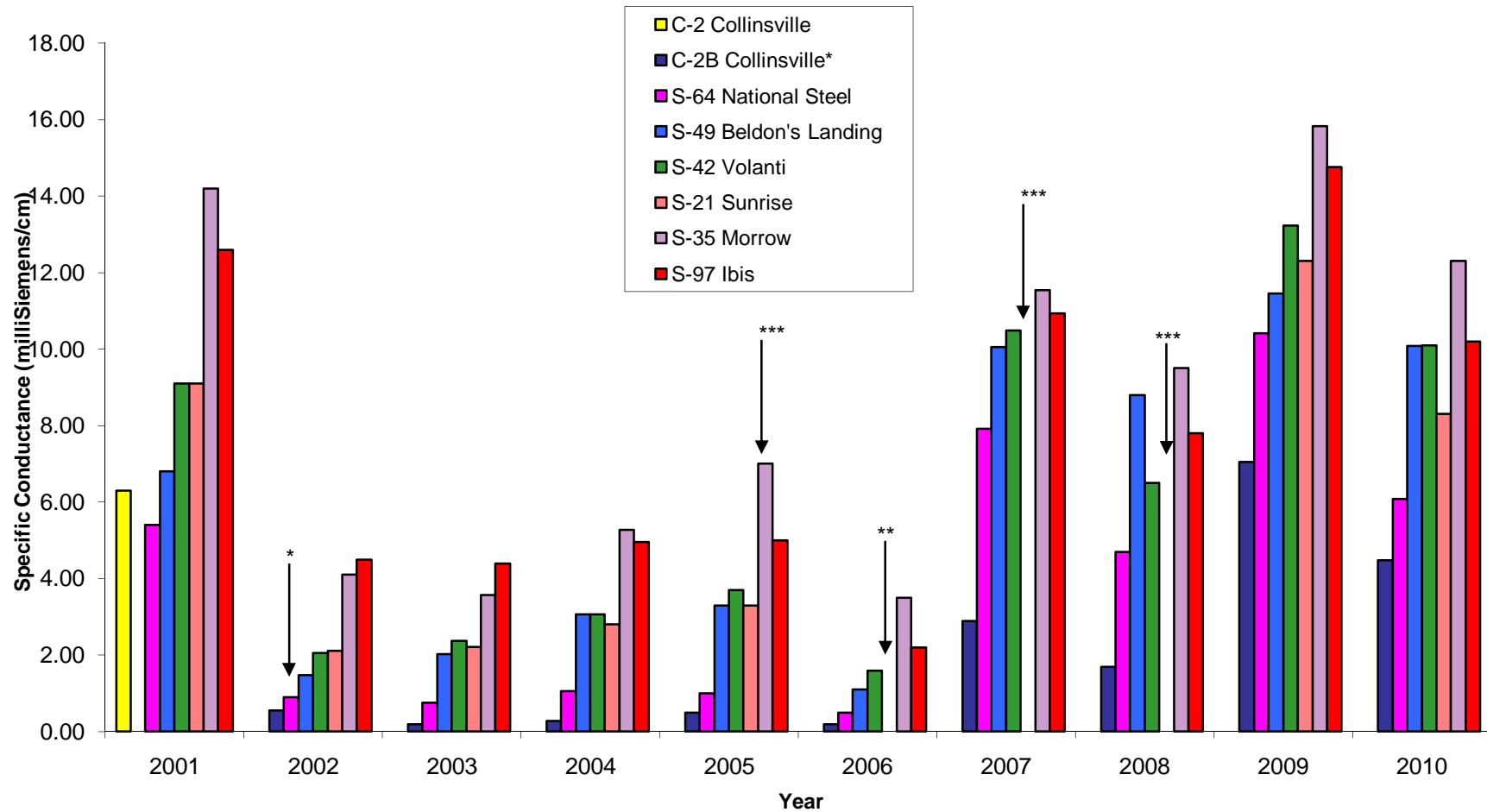


\* Data does not reflect partial month. Data collection was interrupted before the end of the month due to equipment failure.

\*\* Data was not obtained due to power problems at the station.

\*\*\* Data was not obtained due to equipment failure.

**Figure 7. Monthly Mean Specific Conductance at High Tide:  
Comparison of Monthly Values for Selected Stations  
January 2001-2010**

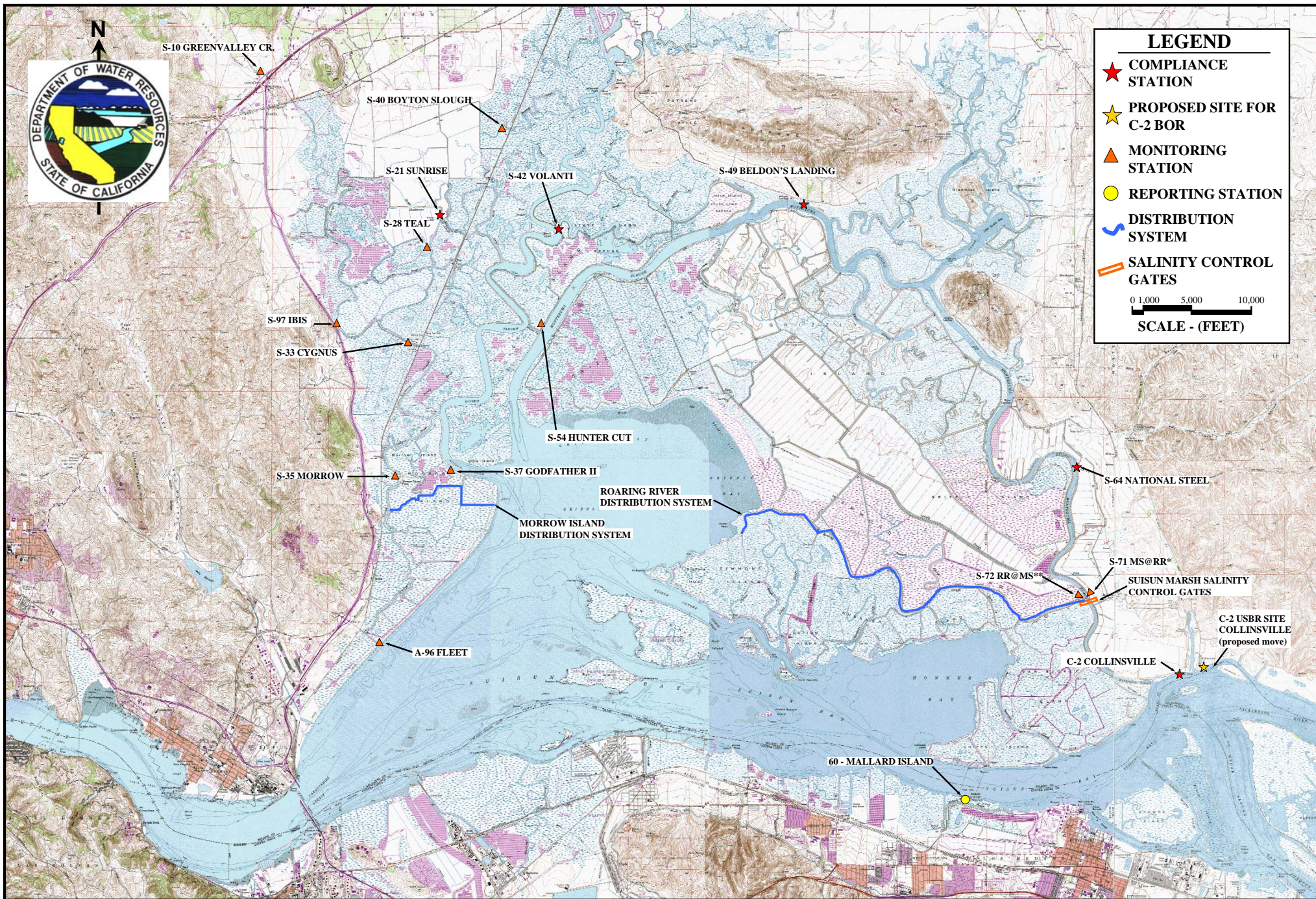


\* = beginning in 2002.

\*\* Data was not obtained due to equipment problem or flood constraint.

\*\*\*Data not representative of end of month value due to missing data.





## SUISUN MARSH PROGRAM WATER QUALITY MONITORING AND CONTROL FACILITIES